

REMARKS:

Upon entry of the instant amendment, claims 1-25 will be pending. Claims 1, 7, 11, and 15-17 have been amended, and new claims 18-25 have been added. No new matter has been introduced. An action on the merits is respectfully requested.

In the Office Action dated March 18, 2005 (hereinafter referred to simply as the "Office Action"), the Examiner objected to the Title of the invention as being non-descriptive, and suggested a new title. The Applicants thank the Examiner for his suggestion and, in accordance therewith, have amended the specification herein to replace the title of the invention with the title that was suggested by the Examiner. As such, the Applicants respectfully request that the objection to the title be withdrawn.

The Examiner also objected to the disclosure in light of informalities (i.e., typographical errors) that appeared in portions thereof. In response, the specification has been amended herein to correct the typographical errors noted by the Examiner, as well as others noted subsequently by the Applicants. As such, the Applicants respectfully request that the objections to the specification be withdrawn.

In the Office Action, the Examiner objected to claims 7, 8, and 11-14 as being dependent upon a rejected base claim. The Examiner indicated, however, that these claims would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The Applicants thank the Examiner for the indication of allowability in connection with claims 7, 8, and 11-14 and, in response to the above-noted objection, have amended herein: (1) Claim 7 by re-writing same in independent format, including all of the limitations of (original) claims 1, 5, and 6; and (2) Claim 11, by re-writing same in independent

format, including all of the limitations of (original) claims 1 and 5. Claim 8 depends from claim 7, and claims 12-14 depend, either directly or indirectly, from claim 11. As such, claims 8 and 12-14 remain in their original format, while claims 7 and 11 have been re-written as required by the Examiner. It is therefore respectfully submitted that claims 7, 8, and 11-14 are now in condition for allowance, and the same is respectfully requested.

In the Office Action, the Examiner also rejected claims 1-6, 9-10, and 15-17 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,895,449 to Nakajima et al. (hereinafter referred to as “Nakajima”), in view of U.S. Patent No. 5,536,902 to Serra et al. (hereinafter referred to as “Serra ‘902”). These rejections are respectfully traversed with respect to the claims as amended (and vis-à-vis the new claims presented) herein.

The present invention is directed to an apparatus (and corresponding method, readable storage medium, etc.) for synthesizing a singing voice, wherein the apparatus comprises, *inter alia*, a phoneme database that stores voice fragment data formed of voice fragments, an input device that inputs lyrics, a readout device that reads out from the phoneme database the voice fragment data, a duration time adjusting device that adjusts time duration of the read-out voice fragment data so as to match a desired tempo, manner of singing, etc., and a synthesizing device that synthesizes a singing sound by sequentially concatenating the voice fragment data.

In embodiments of the invention, an adjusting device is also included that adjusts the deterministic component and the stochastic component of the read-out voice fragment so as to match a desired pitch. In one embodiment, adjustment of the stochastic component (so as to match the desired pitch) is achieved by varying a low frequency region of an amplitude spectrum of the stochastic component according to the desired pitch. In this way, it is possible to prevent

occurrences of an unnatural sound which may otherwise be produced when an attempt is made to match a sound to another pitch. *See, generally, specification as filed, pp. 20-22.*

In this regard, claim 1, as amended herein, recites (emphasis added):

1. A singing voice synthesizing apparatus comprising:

a phoneme database that stores a plurality of voice fragment data formed of voice fragments each being a single phoneme or a phoneme chain of at least two concatenated phonemes, each of the plurality of voice fragment data comprising data of a deterministic component and data of a stochastic component;

an input device that inputs lyrics;

a readout device that reads out from said phoneme database the voice fragment data corresponding to the inputted lyrics;

a duration time adjusting device that adjusts time duration of the read-out voice fragment data so as to match a desired tempo and manner of singing;

an adjusting device that adjusts the deterministic component and the stochastic component of the read-out voice fragment so as to match a desired pitch, said adjusting device being configured to adjust the stochastic component by varying a low frequency region of an amplitude spectrum of the stochastic component according to the desired pitch; and

a synthesizing device that synthesizes a singing sound by sequentially concatenating the voice fragment data that have been adjusted by said duration time adjusting device and said adjusting device.

As noted by the Examiner, Nakajima "omits 'each of the plurality of voice fragment data comprising data of a deterministic component and data of a stochastic component'." *See Office Action, p. 3.* The Examiner asserts, however, that Serra '902 discloses "an adjusting device that adjusts the deterministic component and the stochastic component of the read-out voice frame [sic: fragment] so as to match a desired pitch." Id., p. 4.

Nevertheless, it is respectfully submitted that Serra '902 does not disclose, teach, or suggest adjustment of the stochastic component by separately (and in certain embodiments, solely) treating various frequency regions of an amplitude spectrum of the stochastic component. Thus, for example, as recited in amended claim 1, in order to match a desired pitch, the stochastic component of the voice fragment is to be adjusted by varying a low frequency region of the amplitude spectrum of the stochastic component. However, such treatment of the low frequency region (or, for that matter, any separate, or specific region) of the stochastic component's spectrum is not disclosed or taught by Serra '902.

It is therefore respectfully submitted that Nakajima and Serra '902 do not, either individually or in combination, disclose or teach *an adjusting device that adjusts the deterministic component and the stochastic component of the read-out voice fragment so as to match a desired pitch, said adjusting device being configured to adjust the stochastic component by varying a low frequency region of an amplitude spectrum of the stochastic component according to the desired pitch.* The Applicants therefore respectfully submit that claim 1, as amended, distinguishes over the cited art and is in condition for allowance. As such, it is respectfully requested that the rejection of claim 1 based on Nakajima and Serra '902 be withdrawn.

In addition, claims 2-6, 9, and 10, as well as new claims 18 and 19, depend, either directly or indirectly, from claim 1. As such, and in light of the above discussion, it is respectfully submitted that claims 2-6, 9, 10, 18, and 19 also distinguish over the cited art for at least the same reasons as those noted above in connection with amended claim 1. The

Applicants therefore respectfully request that the rejection of claims 2-6, 9, and 10 be withdrawn as these claims, as well as new claims 18 and 19, are believed to be in condition for allowance.

Each of independent claims 15, 16, and 17 has been amended herein to include the limitation discussed above in relation to claim 1, i.e., that of *adjusting the deterministic component and the stochastic component of the read-out voice fragment so as to match a desired pitch, said stochastic component being adjusted by varying a low frequency region of an amplitude spectrum of the stochastic component according to the desired pitch*. As such, it is respectfully submitted that each of amended claims 15-17 distinguishes over the cited art for at least the same reasons as those noted above in connection with amended claim 1. The Applicants therefore respectfully request that the rejections as to claims 15-17 be withdrawn, as these claims are now believed to be in condition for allowance.

In addition, new claims 20 and 21 depend directly from claim 15, new claims 22 and 23 depend directly from claim 16, and new claims 24 and 25 depend directly from claim 17. As such, it is respectfully submitted that new claims 20-25 also distinguish over the cited art for at least the same reasons as those noted above in connection with amended claims 1 and 15-17. The Applicants therefore respectfully submit that new claims 20-25 are in condition for allowance.

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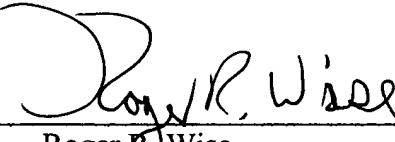
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It is believed that claims 1-17, as amended herein, as well as new claims 18-25, are in condition for allowance, and a favorable action is respectfully requested. If, for any reason, the Examiner finds the application other than in condition for allowance, the Examiner is requested to call one of the undersigned attorneys at the Los Angeles, California telephone number (213) 488-7100 to discuss the steps necessary for placing the application in condition for allowance.

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